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DATA ON THE RADIOSENSITIVITY OF CERTAIN
AGRICULTURAL PLANTS

By S. A. Valeva

- USSR -

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DATA ON THE RADIOSENSITIVITY OF CERTAIN
AGRICULTURAL PLANTS

Following is the translation of an article
by S. A. Valeva in Biofizika (Biophysics),
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A summary table of the radiosensitivity of the seeds of various agricultural plants has been compiled in the laboratory of radiation genetics of the Institute of Biophysics of the Academy of Sciences USSR. The summary includes both literature data, in addition to yet unpublished data obtained by the co-workers of the laboratory, as well as data of other scientific institutions.

The present summary has had as its goal the facilitating of the selection of radiation doses, chiefly for work pertaining to the selection of plants.

As criterion of sensitivity, the so-called "critical dose"* was taken, i.e., the dose in the presence of which an appreciable depression of the development of the plants is observed, but which nevertheless leaves a sufficient quantity of plants (30-20%) capable of yielding seeds at the end of vegetation. The doses are given in roentgens. For some plants the critical dose has still not been exactly elucidated, and there are only approximate data available. Thus, the greater than ($>$) and the less than ($<$) signs signify that the critical dose is greater or less than that indicated, but close to it; the much greater than ($>>$) sign signifies that the critical dose is much greater than that indicated.

* A term introduced for the first time by Gustafsson.

Sensitivity of Agricultural Plants to Gamma-
and X-ray Radiations

Agricultural plant, variety	Form on which Critical the radiation dose in		Author
	acts	r	
1	2	3	4
Clinelimus [Klinelimus]	Dry seeds	<5000	Sorokina
Timothy (Phleum)	The same	<10,000	"
Regneria	"	<5000	"
Corn [Zea mays]	"	10,000	Preobra- zhenskaya
Dnepropetrovsk	"	10,000	Valeva
Krasnodar hybrid	"	10,000	"
Kuban liming	"	10,000	"
VIR 42 [VIR-All-Union Institute of Plant-Grow- ing]	"	10,000	"
Voronezh 76	"	10,000	"
Poďmoskovskaya [Near Moscow]	"	10,000	"
Nemchinov	"	12,000-	"
		15,000	
Hybrids with Nemchinov	"	12,000-	"
		15,000	
Lenin Hills No. 1	"	15,000	Orav
Rye (Secale)	"	10,000-	Gustafs- son
		15,000	
Vyatka	"	20,000	Valeva
Kentucky bluegrass (Poa pratensis)	"	15,000-	Gustafs- son
		20,000	
Digraphis arundinacea	"	16,000	Khertssh [Hirsch]
"	Germinated seeds	8,000	"
Hordeum distichum	Dry seeds	20,000-	Preobra- zhenskaya
		25,000	
"	Pollen in the period of ripening	2,000	Lutkov
		2,500-	
"	Germinated seeds	12,000	"
Oats (avena)	Dry seeds	25,000-	Gustafs- son
		30,000	
Victory	The same	25,000	Preobra- zhenskaya

<u>Agricultural plant, variety</u> <u>1</u>	<u>Form on which Critical</u> <u>the radiation dose in</u>		<u>Author</u> <u>4</u>
	<u>acts</u> <u>2</u>	<u>r</u> <u>3</u>	
Oats (avena)			
Nemchinov	Dry seeds	30,000	Sorokina
Panic gasses (Panicum)			
Krasnoufinsk	"	>25,000	Preobra- zhenskaya
Wheat (Triticum monococcum)	"	<15,000	Gustafs- son
Wheat (Triticum dicoccum)	"	>15,000	"
Wheat (Triticum durum)			
Akmolinka / Akmolinsk 7	"	15,000	Sorokina
Wheat (Triticum vulgare)			
Mil'tunum	"	5,000	Preobra- zhenskaya
Severnaya (Northern)	"	> 5,000	"
Vetvistaya (branched)	"	> 5,000	"
Lyutestsens (Lutescens)	"	~15,000	Orav
Moscow 'Moskovka)	"	<20,000	Valeva
Diamant	"	~15,000	Priylinn
Kauka	"	15,000	"
Motsinava	"	15,000	Grdzeli- shvili
Tsikho 1	"	15,000	"
Kakhi 8	"	15,000	"
Eritrospermum 143 (Erythro- spermum 143)	"	15,000	"
Sudinskaya	"	20,000	Kobylyan- skaya
Hybrid 1429	"	20,000	"
Hybrid 186	"	> 20,000	Valeva
Hybrid 1	"	> 20,000	"
Hybrid 99	"	20,000	"
Hybrid 557	"	20,000	"
Ul'yanovka	"	20,000	"
Meadow foxtail (Alopecurus pratensis)	"	26,000	
Rye grass	"	40,000	Sorokina
Sorghum			
Kaforskoye	"	> 30,000	Nikolayeva
Maylo	"	> 30,000	"
Peterita	"	> 30,000	"
Dzhugari	"	> 30,000	"
Pea (Pisum)	"	5,000- 15,000	Gustafs- son

<u>Agricultural plant, variety</u> <u>1</u>	<u>Form on which Critical</u> <u>the radiation dose in</u>		<u>Author</u> <u>4</u>
	<u>acts</u> <u>2</u>	<u>r</u> <u>3</u>	
Pea (Pisum)	Buds with hardly colored "wings"	2,000	Lutkov
Zhegalov	Dry seeds	5,000	Turkov
Victoria Strube (Viktoriya Shtrobe)	The same	5,000	Preobrazhenskaya
Sakharnyy (Sugar)	"	5,000	"
Rose victoria (Viktoriya rozovaya)	"	> 5,000	"
Shtambovy	"	> 5,000	"
Capital (Kapital)	"	15,000	"
Moscow (Moskovskiy)	"	< 10,000	Valeva, Turkov
Nemchinov	"	10,000	"
Raynray	"	15,000	"
Pisum arvense			
Small seed (Melkosemyannaya)	"	~ 50,000	"
Broad bean (Vicia faba)	"	7,000	"
Bean (Phaseolus)			
VIR variety	"	< 8,000 (near Lenin-grad)	Makasheva
The same	"	> 8,000 (in the Ukraine)	"
Bean (Phaseolus)			
Robust (Robust)	"	< 10,000	Valeva
Tyushadze	"	< 10,000	"
Chokhatau	"	10,000	"
1019	"	10,000	"
1020	"	10,000	"
Izumrudnaya	"	10,000	"
Saint Andrew (Svyatoy Andrey)	"	> 10,000	"
Red seam (Krasnyy rubchik)	"	> 10,000	"
Latvia dry grain	"	> 10,000	"
White Moscow (Moskovskaya belaya)	"	25,000	Preobrazhenskaya
Severnaya (Northern)	"	25,000	"
Phaseolus aureus			
4730	"	30,000	Turkov
Soy bean (Glycine)	"	7,500	"
Kuban 276	"	~ 12,000	Mityukovich

<u>Agricultural plant, variety</u> <u>1</u>	Form on which Critical the radiation dose in		<u>Author</u> <u>4</u>
	<u>acts</u> <u>2</u>	<u>r</u> <u>3</u>	
Soy bean (Glycine)			
Kuban 4958	Dry seeds	20,000	Mityuke- vich
Hybrid 29	The same	20,000	Soldatova
Vigna	"	12,000	Turkov
292	"	20,000	Preobra- zhenskaya
Lathyrus sativus	"	12,000	Turkov
Steppe	"	20,000	Preobra- zhenskaya
Lentil (Lens)	"	12,000	Turkov
1900	"	20,000	Preobra- zhenskaya
Dnepropetrovsk	"	20,000	Priylinn
Lupinus luteus (fodder)	"	60,000	Valeva
Annual Lupinus (alkaloidal)	"	10,000	Valeva
Vicia	"	25,000	Preobra- zhenskaya
31	"	25,000	"
L'gov	"	20,000	Gregory (Gregori)
Arachis	"	25,000	"
"	"	25,000	Valeva
Chick-pea (Cicer arietinum)	"	80,000	"
1168	"	100,000	Preobra- zhenskaya
Lotus corniculatus (Bird's- foot trefoil)	"	100,000	"
Lucerne (Medicago) (alfalfa)	"	10,000	Turkov
Clover	"	10,000	"
Melilatus	"	10,000	"
Onion	"	<10,000	"
Strigunov	"	10,000	Berezina
Lettuce	"	50,000	Gyul'ak- himedov
Bettner's	"	2,000	Osborn
Sugar beet	"	15,000-	Preobra- zhenskaya
Cotton	"	20,000	"
"	Pollen	2,000	"
Perilla	Dry seeds	20,000	"
Tomatoes	The same	20,000	"
Pushkin	"	20,000	"
Harvest (Urozhaynyy)	"	20,000	"

Agricultural plant, variety 1	Form on which the radiation acts 2	Critical dose in r 3	Author 4
Potato	Tubers	5,000	Rubin
"	The same	5,000- 10,000	Nyubom
Sunflower	Dry seeds	7,000	Gustafs- son
Melon			
Kolkhoznitsa (Collective farm)"		>20,000	Soldatova
Spinach			
Fatty leaf (Zhirnolistnyy)	"	25,000	Preobra- zenskaya
Dill	"	30,000	"
Buckwheat			
Bolshevik 2k	"	20,000	Sakharov and others
Bolshevik 4k	"	40,000	"
Cannabis sativa			
Krasnodar	"	30,000	Marko- vich
"	Germinated seeds	8,000- 10,000	Lutkov
Cucumbers			
Podmoskovnyye (Near Moscow)	Dry seeds	50,000	Preobra- zhenskaya
Vyazniki	The same	~50,000	Turkov
Nicotiana (Makhorka)	"	>50,000	Preobra- zhenskaya
Nicotiana (Makhorka)	Pollen	14,000- 17,000	Lutkov
Castor Oil Plant (Ricinus)			
Novo-Kubanskaya	Dry seeds	>50,000	Preobra- zhenskaya
Sesamum indicum (Sesame)	"	>50,000	"
Camelina	"	50,000	"
Brassicus napus var. napifera	"	35,000	Gustafs- son
Cauliflower	"	80,000	Turkov
Heads of cabbage	"	>100,000	Gustafs- son
Late Moscow	"	>80,000	Turkov
Carrot	"	80,000	"
Rice	"	>75,000	Bora
Brassica juncea	"	100,000	Turkov

<u>Agricultural plant, variety</u> 1	Form on which Critical the radiation dose in		<u>Author</u> 4
	<u>acts</u> 2	<u>r</u> 3	
Sinapis alba (White mustard)	Dry seeds	>100,000	Gustafsson
Rape (Brassica napus var. oleifera)			
Nosovskiy	The same	100,000	Preobrazhenskaya
Radish (Horse radish, Raphaeus sativus var. major)			
Winter (Zimnyaya)	"	>100,000	"
Indian mallow (Abutilon Theophrasti)			
085	"	100,000	"
Lallamantia iberica	"	100,000	"
Flax (linum)			
Sunrise (Voskhod)	"	>100,000	Turkov
"	"	200,000	Preobrazhenskaya
Radish (Raphaeus sativus var. minor)			
Rubra	"	>100,000	Turkov
Sachs' (Saks')	"	>200,000	Preobrazhenskaya
Garlic (Allium sativum)	Bulbs	100	Gyul'akhmedov
Strawberry (Fragaria)	Dry seeds	20,000	Mochalova
"	Tendrils	150	"
"	Pollen	8,000	Sakharulidze
Citrus plants { lemons			
{ oranges	Dry seeds	~ 2,000	"
{ grapefruit			
Black currant (Ribes nigrum)	Grafts	3,000	Bauer
Stone-fruit plants	Resting buds	2,500-4,000	Grankhal'
Apple trees	The same	5,000-7,500	"
Pomegranate	Dry seeds	~10,000	Radzhabli
Quince (Cydonia oblonga)	The same	~10,000	"
Grape	Vines	7,500	Breyder
Grape	Dry Seeds	~10,000	Radzhabli
Woody species	Buds in the resting state	12,000	Trudova

<u>Agricultural plant, variety</u> 1	Form on which Critical the radiation dose in		Author 4
	acts 2	r 3	
Woody species	Buds in the period of summer ripening	1,500	Trudova
Pine (<i>Pinus silvestris</i>)	Dry seeds	> 900	Gustafsson
Fir	The same	> 900	"
Alder (<i>Alnus</i>)	"	> 10,000	"
Mulberry tree 2p	"	< 10,000	Radzhabli
" 4p	"	20,000	"
Spiraea	"	30,000	Soldatova
Tulip	Bulb	600	Lusdrekht
Cyclamen	The same	10,000	Reykhardt
Phlox Drummondii			
Defiance	Dry seeds	< 5,000	Priylinn
Petunia hybrids			
Comanche	The same	< 5,000	"
Delphinium hibridum	"	< 5,000	"
Callistephus chynensis	"	5,000	"
Markt			
Chrysanthemum ondicum	"	7,000	Yank
Carthamus tinctorius	"	7,000	Gustafsson
Lathyrus odoratus			
3999	"	10,000	Priylinn
Antirrhinum majus			
Scharlach triumph	"	< 10,000	"
Calendula officinalis	"	< 15,000	"
Gladiolus gandavensis	Bulbs	> 15,000	"
Dianthus caryophyllus	Dry seeds	> 15,000	"
Aquilegia hybrids	The same	> 15,000	"
Papaver somniferum	"	> 15,000	Gustafsson
Polygonum lapathifolium	"	16,000	Utekhin
Mathiola incana			
Teicheri Rubin	"	15,000	Priylinn
Dresden varieties	"	25,000	Shcherbakov
Elscholtia	"	20,000	Kolomiets
Datura tatula	"	20,000	Shteyniger

<u>Agricultural plant, variety</u> <u>1</u>	Form on which Critical the radiation dose in		Author
	<u>acts</u> <u>2</u>	<u>r</u> <u>3</u>	
Datura stramonium	Dry seeds	20,000	Shtey- niger
Phacelia cetifolia	The same	>50,000	Khvostova
Stellaria media	"	64,000	Utekhin
Amaranthus retroflexus	"	>>64,000	"

#1503

END